FY 2004 Budget-in-Brief

U.S. Department of Energy

Energy Efficiency and Renewable Energy

www.eere.energy.gov

TABLE OF CONTENTS

FY 2004 Budget-In-Brief
Introduction

Mission

The mission of the Office of Energy Efficiency and Renewable Energy (EERE) is to strengthen America's energy security, environmental quality, and economic vitality through public-private partnerships that:

- promote energy efficiency and productivity;
- bring clean, reliable, and affordable energy technologies to the marketplace; and
- make a difference in the everyday lives of Americans by enhancing their energy choices and quality of life.

The efficiency and renewable energy programs in this budget impact both energy supply and demand markets, all sectors of the U.S. economy, and all regions of the country. In addition, these efforts directly support the conservation, environmental, critical infrastructure, and security goals and recommendations in the President's National Energy Plan (NEP), including the national priority to reduce energy intensity. This budget also supports the President's Weatherization, Clear Skies, and Climate initiatives; the Secretary of Energy's mission to enhance the Nation's energy security; and the continuing national challenge to reduce volatility in the U.S. energy market.

Objectives

Three objectives being pursued are tied directly to implementing the National Energy Plan:

Modernize energy conservation. EERE energy efficiency programs – the majority of Federal efforts to enhance American energy performance – are improving energy productivity in our homes, vehicles, and factories as well as improving energy production and delivery systems.

Increase energy supplies. EERE works with the private sector to develop renewable energy technologies that can tap America's vast and diversified domestic renewable energy resource base, which today accounts for some 9 percent of domestic energy production.

Modernize our critical energy infrastructure. EERE's portfolio integrates supply and demand systems to develop on-site energy resources, reduce peak demand for energy, and improve the efficiency with which energy is provided and distributed.

Management Strategies

EERE achieves its efficiency, renewable, and infrastructure objectives through a mix of research

and deployment efforts. Undertaking field research with private sector partners facilitates more rapid market adoption of the resulting technologies. And, increasingly, EERE's research and deployment efforts focus on the integrated design of energy efficient and renewable energy systems into homes and commercial buildings, factories, vehicles, and electricity transmission systems. This systems approach generates greater energy savings and use of renewable energy than efforts to improve individual components.

Managing for Results – EERE's New Business Model. Excellence in business management is essential to accomplishing EERE's mission and objectives. In 2002, EERE completely reorganized its program and business functions and, in doing so, implemented the President's Management Agenda and the lessons learned from EERE's 2002 Strategic Program Review. The new EERE business model identifies eleven critical program areas and centralizes business and administration functions to support the eleven programs. This eliminated overlapping functions and reduced layers of management, increasing program manager authority and accountability.

The President's Management Agenda provides a blueprint for more efficient and effective government operations. EERE is implementing the President's Management Agenda through:

- Managing Human Capital. EERE's reorganization reduces supervisory levels from 8 to 4, reduces the number of offices (consolidating 31 programs into 11); and emphasizes core programs and management. EERE is also undertaking workforce analysis.
- Expanding E-Government. Consolidating business systems into a single office simplifies the procurement request and authorization system; promotes a single EERE program/ project management system; improves Inter- and Intranet services and data sharing; and streamlines information technology policies and procedures to align them with DOE's information systems.
- Integrating budget and performance. EERE worked with the Office of Management and Budget on R&D investment criteria (performance measures and benefits estimates) to strengthen performance-based budgeting in its FY 2004 budget development. These efforts will continue for all program and corporate level planning and evaluation efforts.
- Improving Financial Performance. EERE's program planning and implementation improvements will more effectively obligate and cost appropriated funds. In FY 2004, these efforts will reduce end-of-year uncosted obligations by $100 million (compared to fiscal year 2002).
- Competitive sourcing. EERE is participating in a Departmental effort to competitively outsource 15 percent of all commercial activities.

Strategic Program Review. EERE's Strategic Program Review (SPR), developed at the direction of the President's National Energy Plan and released in March 2002, found that EERE research, in the aggregate, generates significant public benefits and generally exhibits technical excellence. These findings have significant independent external support. For example, the National Academy of Sciences/National Research Council's recent review of $1.6 billion worth of EERE R&D identified $30 billion in net realized economic benefits . EERE-supported R&D

is also a top recipient of the coveted "R&D 100" awards. The SPR further concluded, however, that there are significant areas needing improvement. This budget request seeks to implement these improvements. EERE is moving forward on the specific recommendations for the closure, redirection, expansion, or provision for further review ('watch list') of specific efforts, along with the EERE-wide adoption of identified best-practices. In this regard, EERE is conducting oversight and evaluation through technical program management and support of individual programs' strategic and operating plans, feasibility studies, trade-off analyses and evaluation of program performance. These efforts support EERE management's overall objectives of increasing program efficiency and targeting future resources to the most productive program efforts.

2002 Strategic Plan. EERE's FY 2004 budget request reflects the energy policy needs and opportunities identified in its 2002 Strategic Plan, released in November 2002. Recognizing the need to set priorities to make the largest possible contribution, the plan takes into account the National Energy Plan, the Secretary's Departmental mission, EERE's Strategic Program Review, and recent analyses of potential future energy markets. With those goals in mind, EERE has identified the following nine priorities – eight of which are programmatic:

1. Dramatically reduce or even end dependence on foreign oil.
2. Reduce the burden of energy prices on the disadvantaged.
3. Increase the viability and deployment of renewable energy.
4. Increase the reliability and efficiency of electricity generation, delivery and use.
5. Increase the efficiency of buildings and appliances.
6. Increase the efficiency/reduce the energy intensity of industry.
7. Create the new domestic bioindustry.
8. Lead by example through the government's own actions.
9. Change the way we do business

Specific Portfolio Changes. The following specific program shifts in this budget request permit EERE's portfolio to better address strategic priorities and implement the results of the Strategic Program Review.

This budget reflects a large number of programmatic shifts since EERE reorganized the elements of 31 programs into 11 new programs that directly support the eight strategic programmatic priorities:

STRATEGIC PRIORITY	PROGRAM
1. Dramatically reduce or even end dependence on foreign oil	Hydrogen, Fuel Cells & Infrastructure Technologies Program
	FreedomCAR & Vehicle Technologies Program
	Biomass/Biorefinery Systems R&D Program
	Industrial Technologies Program
	Building Technologies Program
2. Reduce the burden of energy prices on the disadvantaged	Weatherization and Intergovernmental Program
	Building Technologies Program
3. Increase the viability and deployment of renewable energy	Solar Energy Program Wind and Hydropower Technology Program Geothermal Technology Program
4. Increase the reliability and efficiency of electricity generation, delivery and use	Distributed Energy & Electricity Reliability Program
5. Increase the efficiency of buildings and appliances	Building Technologies Program
6. Increase the efficiency/reduce the energy intensity of industry	Industrial Technologies Program
7. Create the new domestic bioindustry	Biomass/Biorefinery Systems R&D Program
8. Lead by example through government's own actions	Federal Energy Management Program

Redirections: The transition from Partnership for a New Generation of Vehicles (PNGV) to FreedomCAR is complete for this budget request. This budget request also reflects several other key redirections to be implemented through the EERE reorganization, including:

- Integration of EERE's intergovernmental efforts into a single program strengthens and improves the coordination of EERE's deployment efforts, as recommended in the SPR. This coordination will be further improved by a more integrated use of EERE's Regional Offices as the "gateway" for services.
- Integration of Zero-Energy Building technologies into the new Building Technologies Program, facilitating the incorporation of photovoltaic and solar thermal technologies into improved, high-efficiency building designs.
- Integration of vehicle and stationary fuel cell efforts into a single Hydrogen, Fuel Cells and Infrastructure Technologies Program which is designed to "leap frog" current incremental approaches and accelerate progress towards a hydrogen economy.

- Integration of biopower, biofuel, and bioproducts research into a single Biomass and Biorefinergy R&D Program designed to help develop the technologies needed for an integrated biorefinery industry.

Program Expansions: For FY 2004, the President's budget request of $1.320 billion includes provisions for several key expanded activities, compared to $1.318 billion requested in FY 2003. The programmatic expansions reflect the National Energy Plan, DOE's mission, EERE's priorities, and the SPR recommendations on hydrogen and fuel cell vehicles, lighting, low-speed wind, peak load reduction, and biomass.

In his State-of-the-Union speech on January 28, 2003, President Bush announced the Hydrogen Fuel Initiative, a new research and development initiative focused on hydrogen that, in conjunction with the FreedomCAR program, will help reverse America's growing dependence on foreign oil and expand the availability of clean, abundant energy.

- **President's Hydrogen Fuel Initiative**. The Hydrogen Fuel Initiative will accelerate research and development on hydrogen production, delivery, storage and distribution, and establish the necessary safety-related codes and technology standards. The Initiative also will accelerate the demonstration of fuel cell vehicles and hydrogen infrastructure so that these technologies can be validated under real world conditions. When the vision of the Hydrogen Fuel Initiative is achieved, hydrogen fuel cells will provide energy for our cars, trucks, homes, schools and businesses. These advances also will expand and accelerate the use of fuel cells for stationary electric power applications.

- **FreedomCAR**. Last year the Bush Administration announced FreedomCAR, a public-private partnership with U.S. automakers to accelerate the development of practical, affordable hydrogen fuel cell vehicles. Hydrogen fuel cell vehicles require no petroleum-based fuels and emit no pollutants or carbon dioxide. Their development and commercial success would remove personal transportation as an environmental issue and substantially reduce our dependence on foreign oil. FreedomCAR is working to lower the cost and advance the technology of such vehicles to allow them to be commercially available and affordable, *provided* that the necessary hydrogen refueling infrastructure is available. Pursuing FreedomCAR and the President's Hydrogen Fuel Initiative in parallel will enable automotive manufacturers and the energy industry to make a commercialization decision in 2015 regarding fuel cell vehicles and hydrogen infrastructure.

- **Solid State Lighting (SSL).** The lighting used in our homes and offices today is in many ways similar to the vacuum tubes that preceded solid state electronics. This comparatively inefficient lighting consumes about 7 quadrillion Btus of the Nation's energy each year and constitutes a large percentage of the peak electricity loads that strain our electricity infrastructure. Advancing the technology and lowering the cost of organic and inorganic light emitting diodes (LEDs) will lead to more efficient, flexible and functional lighting technology in the future. SSL will build on other Building

Technologies Program research that aims to improve the energy efficiency of buildings materials, designs, and associated heating, cooling, and lighting equipment and other appliances.

- **National Climate Change Technology Initiative (NCCTI)**. This Presidential initiative will help the United States develop innovative technology options for reducing the carbon intensity of our economy.

- **Weatherization Assistance Program**. The Weatherization Assistance Program, delivered through a network of 970 local agencies throughout the country, improves the energy efficiency of the homes of low-income families. The Bush Administration has commited to increase the investment in the program by $1.4 billion over ten years.

Complementary Appropriations

EERE's budget is appropriated in bills managed by two Congressional Appropriation Subcommittees. The Energy and Water Development (EWD) Appropriations Subcommittee supports EERE's work on renewable energy under the Energy Supply appropriation account. In FY 2004, the request in the EWD account totals $444.2M, or about 34 percent of EERE's budget. In addition, the Interior and Related Agencies (Interior) Appropriations Subcommittee supports EERE's energy efficiency efforts under the Energy Conservation appropriation account. The FY 2004 request in the Interior account totals $875.8M or about 66 percent of EERE's budget. Six programs are jointly funded: Hydrogen, Fuel Cells, and Infrastructure; Weatherization and Intergovernmental; Distributed Energy; Building Technologies; Biomass; and Federal Energy Management.

Combined, these funding sources contribute to meeting our Nation's energy challenges and goals and provide enhanced public benefits that otherwise could not be realized.

Biomass Program

The Biomass Program is developing integrated biorefinery technologies that are cleaner and more efficient, reliable, and lower in cost. Integrated biorefineries are converting biomass – principally plant materials (e.g., agricultural residues and dedicated energy feedstocks) – into multiple products such as ethanol for transportation fuel, electricity, and products such as plastics, coatings, and lubricating oils.

The program focuses on achieving further cost reductions for bioconversion and thermochemical conversion technologies, and developing advanced equipment and techniques to expand the infrastructure needed to collect and transport biomass. By focusing resources on more targeted and more coherent goals and objectives, the program, in collaboration with the Department of Agriculture (USDA), will take advantage of the emerging technology synergies amongst biomass power, biofuels, and the production of bio-based products.

America possesses abundant biomass resources available throughout the country such as crop residues, forest residues, and municipal solid wastes. In view of the resource potential, the Biomass Program contributes to several national energy and environmental priorities, including recommendations of the National Energy Plan which states that biomass has "...the potential to make more significant contributions in the coming years." Biomass and Biorefinery Systems R&D supports the goals of increasing energy supplies, improving energy efficiency, accelerating the protection and improvement of the environment, and increasing energy security and is in direct support of the Biomass R&D Act of 2000 and the Farm Security and Rural Investment Act of 2002.

FY 2004 Budget Request

In FY 2004, the Department is requesting $78.6M, a decrease of $31.4M below the FY 2003 request. The reduced level is a result of the integration of the EERE bioenergy activities to focus resources on a limited set of goals and objectives. In addition, EERE's gasification technologies development activities with the Forest and Paper Industry have succeeded to the point that they are ready for large scale demonstrations and soon could be commercialized by industry. The Department's request also recognizes that USDA will receive $14 million dollars in mandatory biomass R&D funding in FY 2004, and that the Biomass Research and Development Board (established by the Biomass R&D Act of 2000) will provide overall direction for using these funds to complement DOE in biomass research investments.

The program receives appropriations from both the Energy and Water Development and the Interior and Related Agencies subcommittees. Energy and Water activities focus on developing advanced technologies for biorefineries, including producing low cost sugars from biomass as intermediates in the production of fuels and bio-based products, and conversion technologies for biomass-based power and fuels. Interior activities focus on developing advanced

technologies for more energy efficient industrial processes and high-value industrial products, i.e., technologies with potential biorefinery applications that are complementary to, and synergistic with, the Energy and Water activities.

	Funding (dollars in thousands)	
Activity	**FY 2003 Request**	**FY 2004 Request**
Energy and Water Development-		
• Advanced Biomass Technologies R&D	37,430	31,000
• Systems Integration and Production	48,575	38,750
Interior-		
• Advanced Biomass Technologies R&D - Products Development	8,259	8,408
• Systems Integration and Production - Industrial Gasification	14,680	0
• Technical Program Management Support	1,000	400
Total-	$109,944	$ 78,558

FY 2004 focus

- Advanced Biomass Technologies R&D will continue testing of catalysts and clean-up and conditioning technologies for biomass gasifiers. In addition, R&D will continue on processes integral to industrial biorefinery systems, such as research in thermochemical processes to produce biomass-derived fuels (gasoline, diesel, hydrogen and others). Collaboration with industry will continue to develop fermentation and other processes that provide increased stability and robustness in the production of ethanol and chemicals. Furthermore, existing and additional partnerships with enzyme, biomass ethanol, and other biochemical producers to accelerate the use of cellulase enzyme systems will be supported. Parallel retreatment R&D will continue.

- The Products Development effort will fully integrate with the Biomass Program and support development of the integrated biorefinery, including technology development associated with novel separations technologies, bio-based plastics, and novel products from oils. It also will work to lower costs of biomass harvesting, pre-processing and storage.

- Systems Integration and Production activities will consist of determining the effects of high moisture feedstocks on syngas generation and intermediate product formulation, and conducting final testing of small modular biopower systems with high moisture feedstock. Efforts also will include integrated testing of the hydrolysis process (i.e., handling, pretreatment, cellulose hydrolysis, and fermentation) for converting agricultural residues such as corn stover to ethanol. In collaboration with industry and USDA, novel harvesting equipment, storage, and logistics concepts for agricultural wastes will be developed.

Building Technologies Program

The Building Technologies Program, in partnership with industry, government agencies, universities and national laboratories, develops technologies, techniques and tools to make residential and commercial buildings more energy efficient, productive and affordable. Its portfolio includes improving the energy efficiency of building components and equipment as well as developing highly-efficient, whole-building, system-design techniques. The program also supports the development of building energy efficiency codes and national energy efficiency standards for appliances and building equipment; integrates renewable energy systems into building design and operation; and conducts technology transfer, education and information exchange. The program works to forge consensus on research directions and priorities, and industry-wide codes and standards.

Energy use by residential and commercial buildings accounts for over one-third of the Nation's total energy consumption – including two-thirds of the electricity generated in the U.S. – and costs the Nation about $240 billion annually. Improving the energy efficiency of buildings and equipment reduces energy consumption – especially during critical peak demand periods – which also reduces America's vulnerability to energy supply disruptions, energy price spikes and constraints on the Nation's electricity infrastructure. In addition, new energy efficiency technologies can have significant economic and environmental benefits such as reduced greenhouse gas emissions.

Under the recent EERE reorganization, the Building Technologies program has taken responsibility for Zero-Energy Buildings (ZEB) activities, while the Solar Energy program retains management of R&D on solar energy equipment and components for buildings use.

The President's National Energy Plan calls for "modernizing energy conservation" and "establishing a national priority for improving energy efficiency." The National Energy Plan targets improving the energy efficiency of appliances – including setting higher national efficiency standards where technically feasible and economically justified.

FY 2004 Budget Request

For FY 2004, the Department is requesting $56.6M for the Building Technologies Program, an increase for Residential Buildings, no change for Commercial Buildings, and a decrease for Emerging Technologies and Equipment Standards and Analysis from FY 2003 request levels .

The program receives appropriations from the Interior and Related Agencies and Energy and Water Development subcommittees.

	Funding (dollars in thousands)	
Activity	**FY 2003 Request**	**FY 2004 Request**
Energy and Water Development-		
• Zero-Energy Buildings	8,000	4,000
Interior-		
• Residential Buildings	13,433	15,230
• Commercial Buildings Integration	4,995	4,995
• Emerging Technologies	22,618	21,821
• Equipment Standards and Analysis Program	9,197	9,017
• Technical/Program Management Support	2,320	1,500
Total-	$60,563	$56,563

Interior Committee activities focus on the following efforts to develop more energy efficient buildings and equipment.

- Residential Buildings Integration activities include RD&D for space heating and cooling, ventilation, water heating, lighting and home appliance loads and the development of residential building codes and standards to support whole-building design techniques.
- Commercial Buildings Integration activities accelerate the development and adoption of new technologies and design practices, validate energy efficiency designs and practices, and improve commercial building codes and standards.
- The Emerging Technologies activities support RD&D of energy-efficient products and technologies for both residential and commercial buildings, including lighting, building envelope and advanced window technologies, and new appliance designs.
- Equipment Standards and Analysis activities improve appliance and equipment efficiency by developing equipment test procedures and standards.

Energy and Water Committee activities focus on integrating renewable energy technologies into building design, construction and operations. For example, the Zero Energy Buildings activities integrate renewable energy technologies – solar energy and other distributed energy technologies – into the design and operation of residential and commercial buildings to create buildings that produce as much energy as they consume on an annual basis.

FY 2004 Focus

- Conduct R&D and support technology implementation to reduce overall residential building energy use by 60 percent compared to the model code IECC of 2000, and work with the Building America Consortia to validate the performance of at least 900 houses (constructed to meet Building America performance requirements in five climate zones) to investigate the best innovative solutions.

- Establish generic design processes to reduce energy use by 20 to 40 percent in a wide range of commercial building types. In association with private-sector partners, provide R&D assistance, design and post construction evaluation and documentation of up to four new building projects with a 50 percent or better improvement in energy performance compared to today's typical construction practices.

- Expand Solid State Lighting research and development; and develop and demonstrate innovations in windows, climate control and refrigeration, building envelopes, appliances and software modeling tools.

- Issue up to four rules to amend appliance standards and test procedures for residential furnaces and boilers, dishwashers, commercial unitary air conditioners and heat pumps, and electric distribution transformers.

- Complete evaluation and monitoring of first generation ZEB homes to collect data on reduction in annual utility bills, load profiles, load match with PV output and reliability and durability of the whole-house/PV systems. Using the data collected from the first generation ZEB homes, develop advanced optimization methods for second-generation ZEB houses which will achieve utility bills of a dollar-a-day.

Distributed Energy and Electric Reliability Program

The Distributed Energy and Electric Reliability Program works to strengthen America's electric energy infrastructure and provide utilities and consumers with a greater array of energy efficient technology choices for the generation, transmission, distribution, storage, and demand management of electric power and thermal energy.

The program contributes to several national energy and environmental goals. For example, expanding the use of distributed energy and electric reliability technologies upgrades America's aging electric power infrastructure, relieves congestion on transmission and distribution systems, reduces the use and increases the supply of electricity during periods of peak demand, and reduces environmental emissions, including greenhouse gases. The program supports EERE's strategic goal to increase the reliability and efficiency of electricity generation, delivery, and use.

Distributed energy involves the use of relatively small-scale and modular energy generation devices installed onsite or near the customer's premise. Electric reliability involves the use of electric energy systems for addressing electricity transmission and distribution problems, including grid congestion, outages, power quality disturbances, and line losses. Technologies include industrial gas turbines, microturbines, reciprocating engines, chillers, desiccants (for humidity control), integrated energy systems and CHP, energy storage devices, utility interconnection equipment, transmission and distribution systems, communication and control systems, and high temperature superconducting materials and equipment.

To address regulatory and institutional barriers to the use of distributed energy and electric reliability technologies, the program conducts analysis, and education, and outreach activities in partnership with industry groups and Federal and State government agencies. The aim is to streamline siting, permitting, and interconnection procedures, accelerate distributed energy project development timetables, and lower installation costs.

FY 2004 Budget Request

In FY 2004, the Department of Energy is requesting $128.6M, a decrease of $2.5M below the FY 2003 request. The program receives appropriations from both the Energy and Water Development and the Interior and Related Agencies subcommittees. Energy and Water activities focus on developing advanced electric reliability technologies, including high temperature superconducting systems. Interior activities focus on developing cleaner and more energy efficient distributed energy generation equipment and integrating them into end use applications for addressing the electric and thermal needs of consumers.

The program is organized into the following areas of activity:

	Funding (dollars in thousands)	
Activity	**FY 2003 Request**	**FY 2004 Request**
Energy and Water Development- Electricity Reliability		
• High temperature superconductivity R&D	47,838	47,838
• Transmission reliability R&D	7,720	10,720
• Distribution and interconnection	7,249	7,249
• Energy storage	7,640	5,000
• Renewable Energy Production Incentive	4,000	4,000
• Electricity restructuring	2,059	2,059
Interior- Distributed Energy Resources		
• Distributed generation technology development	39,916	31,916
• End-use systems integration and interface	19,338	19,338
• Technical Program Management Support	530	530
Total-	$131,290	$128,650

FY 2004 Focus

- Begin testing of General Electric 100 MW Superconducting generator developed by a General Electric-led team which includes the New York State Research and Development Authority, American Electric Power, national laboratories and others.

- In a collaborative venture with the Tennessee Valley Authority, develop a 16MW transmission stability device incorporating supercapacitor storage with fast inexpensive switches developed by DOE.

- Establish and maintain technical analysis and information dissemination partnerships with 10 to 15 new national, State, and regional organizations with roles in utility restructuring legislation and regulation.

- Evaluate technology advancements to assess the cross-cutting impacts and benefits of enabling technologies such as materials, information technologies, sensors and power electronics for a wide variety of distributed generation systems and other end-use applications.

- Continue partnerships with industry consortiums (commercial building, merchant stores, light industrial, supermarkets, restaurants, hospitality, healthcare industries) to identify promising applications for distributed energy technologies to meet power and specialized thermal needs.

- Continue partnerships with industry to develop the "next generation" microturbines, reciprocating engines and thermally activated technologies.

Federal Energy Management Program

Federal Energy Management Program (FEMP) increases the energy security and reduces the energy costs and environmental impact of government by promoting energy efficiency, water conservation, use of distributed and renewable energy, and sound utility management decisions at federal sites.

The Federal Government, the Nation's single largest energy consumer, uses almost one quadrillion Btus (one quad) of energy annually. In fiscal year 2000, the government spent about $4 billion on energy to heat, cool, light, and conduct operations in 500,000 buildings. Indeed, because it is such a large energy consumer, the National Energy Plan recommended that heads of executive departments and agencies "take appropriate action to conserve energy use at their facilities to the maximum extent consistent with effective discharge of public responsibilities."

FEMP employs a variety of approaches to assist agencies in realizing energy, environmental and cost savings potential, including: interagency coordination committees; direct technical assistance; education and training, information and outreach programs; targeted project financial support; and assistance in accessing alternative private sector funding (Energy Savings Performance Contracts or ESPCs).

The Departmental Energy Management Program (DEMP) implements the FEMP mission specifically for U.S. Department of Energy facilities, providing funding support and technical assistance for energy management projects and to expand the use of private sector financing for energy management. The Department owns or leases about 11,000 buildings at more than fifty sites across the United States. Overall DOE will reduce its energy intensity per square foot by more than 40 percent by 2005 (compared to 1985) and will save over $100 million annually in avoided costs.

FY 2004 Budget Request

In FY 2004, the Department is requesting $22.3M, a decrease of $4.1M from the FY 2003 budget request.

	Funding (dollars in thousands)	
Activity	**FY 2003 Request**	**FY 2004 Request**
Energy and Water Development-		
• Departmental Energy Management Program	3,000	2,300
Interior-		
• Project Financing	8,695	8,227
• Technical Guidance and Assistance	11,042	8,242
• Planning, Reporting and Evaluation	2,803	2,603
• Technical/Program Management Support	890	890
Total-	$26,425	$22,262

FY 2004 Focus

- Achieve between $70M and $110M in private sector investment through Super ESPCs. The average Super ESPC is $3M, generating approximately 8,000 Btus in annual energy savings for each dollar invested. The annual energy savings for an average project is 26.3 billion Btus which equates to an average annual energy cost savings of over $400,000.

- Provide technical and design assistance for 75 energy efficiency, renewable energy, O&M, and DER/CHP, and water conservation projects and report resulting impacts (e.g., energy intensity reduction inputs).

- Conduct 25 SAVEnergy Audits and industrial facility assessments to identify energy and cost saving opportunities.

- Train 4,000 Federal employees in energy management best practices to support National Energy Plan education goals.

- Provide direct funding and leveraged cost sharing at various DOE facilities for energy projects that provide annual energy savings of greater than 20 billion Btus and a 25 percent return on investment.

FreedomCAR and Vehicle Technologies Program

The FreedomCAR and Vehicle Technologies (FCVT) Program is developing more energy efficient and environmentally friendly transportation technologies to help reduce United States petroleum consumption. The long-term aim of the program is to develop "leap frog" technologies (such as FreedomCAR's hydrogen-fueled vehicles) to provide Americans with freedom of mobility along with energy security, lower costs and lower environmental impacts. Program activities include research, development, demonstration, testing, technology validation, technology transfer, and education that could achieve: (1) significant improvements in vehicle fuel efficiency; and (2) displacement of oil by other fuels which ultimately can be domestically produced in a clean and cost-competitive manner.

In partnership with auto manufacturers, heavy vehicle manufacturers, equipment suppliers, energy companies, other Federal agencies, State and local governments, universities, national laboratories and other stakeholders, the program targets Federal technology development investments and cost-shared projects to provide leveraged benefits for the American taxpayer. The Program focuses specifically on areas that industry would not pursue alone due to high risks and uncertain or long-term outcomes. Two efforts represent the major crosscutting elements of the program – the FreedomCAR and the 21st Century Truck Partnerships.

The FreedomCAR Partnership is jointly executed with EERE's Hydrogen, Fuel Cells, and Infrastructure Technologies Program and in collaboration with the U.S. Council for Automotive Research (USCAR), whose member companies include Ford, General Motors and DaimlerChrysler. The FreedomCAR Partnership supersedes and builds upon the successes of the Partnership for a New Generation of Vehicles (PNGV) that began in 1993. FreedomCAR shifts government research to more fundamental, higher risk activities with applicability to multiple passenger vehicle models and special emphasis on fuel cell development.

The 21st Century Truck Partnership has similar aims, but is focused on improving technologies for heavy vehicles to make our nation's trucks safer, cleaner, and more efficient. The 21st Century Truck Partnership is a cooperative effort among key members of the heavy vehicle industry, truck manufacturers, hybrid propulsion developers and engine manufacturers and several Federal agencies. Ultimately, the partnership seeks to develop trucks and buses that use sustainable and self-sufficient energy sources, thereby enhancing America's global competitiveness.

FreedomCAR and 21st Century Truck Partnership activities contribute to several national energy and environmental policy objectives. For example, the National Energy Plan calls for reducing dependence on oil imports and modernizing conservation technologies and practices. President Bush has observed that ". . . any effort to reduce (oil) consumption must include ways to safely make cars and trucks more fuel efficient. New technology is the best way to do so."

FY 2004 Budget Request

In FY 2004, the Department is requesting $157.6M, an increase of $4.1M above the FY 2003 request for the FreedomCAR and Vehicle Technologies program. The FreedomCAR portion of the program's budget request is $91.1M, an increase of $16.7M above the FY 2003 request. All funding for transportation fuel cell and hydrogen infrastructure activities is included in the Hydrogen, Fuel Cells, and Infrastructure Technologies program to accelerate RD&D activities to support the FreedomCAR and the President's Hydrogen Fuel Initiative. It is expected that these enhanced programs will result in an industry commercialization decision in the year 2015, allowing accelerated market penetration, oil displacement and environmental benefits for the year 2020 and beyond.

The FY 2004 request for subprogram activities within the FreedomCAR and Vehicle Technologies program are as follows: Vehicle Systems, $14.5M, essentially level funding; Innovative Concepts, $0.5M, a decrease of $1.1M; Hybrid and Electric Propulsion, $49.6M, an increase of $7.6M; Advanced Combustion Engine, $37.1M, a decrease of $3.1M; Materials Technology, $39.6M, an increase of $10.2M; Fuels Technology, $6.8M, a decrease of $11.2M; Technology Introduction, $5.9M, level funding; Technical/Program Management Support, $2.1M, level funding; and biennial peer review, $1.5M, which was zero in the FY 2003 request.

	Funding (dollars in thousands)	
Activity	**FY 2003 Request**	**FY 2004 Request**
• FreedomCAR*	74,476	91,129
• 21st Century Truck Partnership	70,087	57,494
• Other	9,000	9,000
Total-	$153,563	$157,623

* The FreedomCAR Partnership is funded by the FreedomCAR and VT Program and the HFCIT Program.

FY 2004 Focus

The focus of the FreedomCAR and Vehicle Technologies Program request is to:

- Expand emphasis on energy storage and materials technologies critical for fuel cell and combustion hybrid vehicles to include: new propulsion and light-weight materials for fuel cell and combustion hybrid vehicles; and an increased emphasis on long-term energy storage concepts.

- Accelerate the development of low cost, abuse-tolerant lithium sulfur battery technology; investigate methods to protect the surface of the lithium electrodes and prevent dendrite formation in batteries with lithium metal anodes, including lithium metal polymer electrolyte and lithium sulfur systems; investigate the use of nano-structured materials such as cathodes in lithium batteries; and explore novel electrochemical energy storage technologies.

- Develop advanced hybrid propulsion components for cars and trucks; complete light truck engine effort to greatly improve engine efficiency; and increase truck efficiency through greater electrification and aero drag reduction.

Geothermal Technologies Program

The Geothermal Technologies Program works in partnership with industry to establish advanced geothermal energy as an economically competitive contributor to the U.S. energy supply. Geothermal energy production, a $1.5 billion a year industry, generates electricity or provides heat for direct applications including aquaculture, crop drying, and district heating, or for use in heat pumps to heat and cool buildings. Resources for geothermal electric power production are primarily in the western U.S. Net installed geothermal power capacity in the U.S. has grown from about 500 to 2,800 MW since 1973 and today accounts for about 17 percent of all U.S. renewable energy production, and 6 percent of all of California's electricity.

The current technology relies on extracting energy in the form of steam or hot water from geothermal reservoirs. In order to sustain productivity of the resource, used geothermal water and condensed steam typically are injected back into the reservoir. Any available water – such as effluent from municipal treatment plants – can be injected into geothermal reservoirs to augment energy production. In the case of municipal effluent, geothermal reservoirs provide a safe, effective means of waste water disposal.

In accomplishing its mission, the Geothermal Technologies Program addresses national energy, environmental, and security priorities by providing the Nation with additional domestic sources of electricity supply that are highly reliable, cost competitive, and clean. Geothermal electricity

generation is not subject to price volatility and supply disruptions from changes in global energy markets.

FY 2004 Budget Request

In FY 2004, the Department of Energy is requesting $25.5M, a decrease of $1.0M from the FY 2003 request. To harness the potential of geothermal energy, the program is directing its efforts in three interrelated research areas: Geoscience and Supporting Technologies, Exploration and Drilling Research, and Energy Systems Research and Testing. The Program receives appropriations from Energy and Water Development.

	Funding (dollars in thousands)	
Activity	**FY 2003 Request**	**FY 2004 Request**
Energy and Water Development-		
• Geoscience and Supporting Technologies	7,700	10,200
• Exploration and Drilling	12,100	11,500
• Energy System Research and Testing	6,700	3,800
Total-	$26,500	$25,500

FY 2004 Focus

- Conduct research on reservoir models, fracture dynamics, fluid flow processes, tracers, and rock-water interactions in support of technology development for Enhanced Geothermal Systems (EGS).

- Work in collaboration with industry partners to create EGS reservoirs at three different sites.

- Partner with industry to explore for new geothermal resources that are suitable for generating electricity.

- Conduct additional field tests of an improved Diagnostics-While-Drilling subsystem for instrument accuracy and temperature durability.

- Focus research in energy conversion technology on the most promising innovative systems, such as air-cooled condensers. These system improvements have the highest likelihood of increasing efficiency while reducing cost.

- Maintain outreach and education activities focused on key regional and State geothermal development barriers and opportunities, and continue to support the National Geothermal Collaborative.

Hydrogen, Fuel Cells and Infrastructure Technologies Program

The Hydrogen, Fuel Cells and Infrastructure Technologies Program directs research, development and validation of fuel cell and hydrogen production, delivery, and storage technologies for transportation and stationary applications. Program efforts will contribute to dramatically reducing U.S. dependence on foreign oil; promoting the use of diverse, domestic, and sustainable energy resources; reducing carbon and criteria emissions; and increasing the reliability and efficiency of electricity generation by utilizing distributed fuel cells.

The President announced in his January 28, 2003, State of the Union address that he is seeking $1.2 billion in research funding over the next five years to enable the U.S. to "lead the world in developing clean, hydrogen-powered automobiles." EERE's Hydrogen, Fuel Cells and Infrastructure Technologies Program is a key component of the Administration's FreedomCAR initiative and the President's Hydrogen Fuel Initiative. The President's Hydrogen Fuel Initiative, combined with FreedomCAR (announced in January 2002), will enable industry to make a commercialization decision by 2015, thereby allowing accelerated market adoption of hydrogen vehicles, significant oil displacement and environmental benefits. These initiatives support the President's National Energy Plan and will allow the Nation to move forward aggressively to achieve a secure, emissions-free energy future.

The program's activities are carried out in partnership with vehicle and power equipment manufacturers, energy companies, electric and natural gas utilities, federal and state agencies, universities, national laboratories, and other stakeholders.

FY 2004 Budget Request

In FY 2004, the Department is requesting $165.5M for the Hydrogen, Fuel Cells, and Infrastructure Technologies Program, an increase of $68.1M from the FY 2003 request. DOE's Office of Fossil Energy (FE) and Nuclear Energy (NE) are requesting an additional $15.5M in support of the President's Hydrogen Fuel Initiative and EERE is working closely with FE and NE to coordinate hydrogen production efforts. The EERE request reflects significant program realignment and reflects functional priorities of the program – hydrogen production and delivery,

hydrogen storage, hydrogen infrastructure validation, safety and codes/standards related to hydrogen and its infrastructure, education and cross-cutting analysis, fuel cell cost reduction, and fuel cell vehicle technology validation.

The program receives appropriations from both Interior and Related Agencies and Energy and Water Development. The fiscal year 2004 request proposes that all fuel cell activities be performed under Interior and Related Agencies Appropriation and all hydrogen production, delivery, and storage will continue under the Energy and Water Development Appropriation.

	Funding (dollars in thousands)	
Activity	**FY 2003 Request**	**FY 2004 Request**
Energy and Water Development- Hydrogen Technology		
• Production and Delivery	11,760	23,000
• Storage	11,335	30,000
• Infrastructure Validation	10,000	13,160
• Safety, Codes & Standards, and Utilization	4,786	16,000
• Education and Cross-Cutting Analysis	2,000	5,822
Interior- Fuel Cell Technology		
• Transportation Systems	7,600	7,600
• Distributed Energy Systems	7,500	7,500
• Stack Component R&D	14,900	28,000
• Fuel Processor R&D	25,300	19,000
• Technology Validation	1,800	15,000
• Technical/Program Management Support	400	400
Total-	$97,381	$165,482

FY 2004 Focus

Hydrogen Activities

- Hydrogen production and delivery research will be expanded. Hydrogen producers and other industry partners will work to improve efficiency and lower the cost of technologies that generate hydrogen from natural gas and renewable resources such as advanced electrolysis using wind power, biomass pyrolysis, and direct water splitting from solar energy.
- Vehicle hydrogen storage activities will continue R&D of solid-state materials with the potential to meet 2010 storage targets, and identify and initiate R&D of innovative chemistries and novel materials with the potential to achieve 2015 storage targets.
- Infrastructure activities to develop and validate the feasibility of hydrogen generation stations that derive hydrogen from both renewable and fossil-fuel feedstocks for stationary and transportation fuel cell systems will continue. This activity also will validate power park systems to co-produce hydrogen for vehicle and stationary fuel cells at user facilities.
- A national education campaign will be developed to educate potential end users, local governments, and others about hydrogen and fuel cells, and to clearly communicate the hydrogen vision. This supports a National Energy Plan recommendation.
- Safety, codes/standards, and utilization activities will focus on ensuring the safety of hydrogen technologies and on developing widely-accepted technology codes and standards.

Fuel Cells Activities

- Transportation Systems will update the systems cost analysis to track progress against the 2015 cost goal of $30/kW, and will develop key systems components such as sensor and compressor/expander technology.
- Distributed Energy Systems will develop integrated stationary fuel cell systems that meet stringent durability and cost requirements, and investigate low temperature fuel cell systems designed for combined heat and power applications.
- Stack Component R&D will be expanded to address critical cost reduction requirements of fuel cell components. Low-cost membrane development and catalyst reduction are two key fuel cell stack component cost reduction activities that address the requirements of both stationary and transportation applications.
- Fuel Processor R&D will make a major Go/No Go decision, focusing on the feasibility of on-board fuel processors to achieve the established start-up target of <0.5 minutes. The decision will determine the future course of on-board vehicle fuel processing activities. If

R&D does not confirm a clear path to meet the target, a major change in research direction will be implemented.

- Technology Validation is increased to conduct a controlled fleet demonstration of fuel cell vehicles to validate performance, cost, and reliability. Data from the demonstrations will be used to refine research and development activities and identify remaining technical barriers. The Technology Validation activity will be conducted in cooperation with the Hydrogen Infrastructure Validation effort to develop an improved understanding of vehicle and infrastructure interface issues.

Industrial Technologies Program

The Industrial Technologies Program improves the energy intensity of the U.S. industrial sector through coordinated research and development, validation, and dissemination of energy-efficiency technologies and operating practices. The largest energy-consuming sector, industry employs diverse processes and technologies. The program partners with industry, its equipment manufacturers, and its many stakeholders to reduce our Nation's reliance on foreign energy sources, reduce environmental impacts, increase the use of renewable energy resources, improve competitiveness and improve the quality of life for all Americans.

Since industry energy consumption accounts for about 35 percent of all U.S. energy use, improved industrial energy efficiency reduces energy demand per unit of industrial output (energy intensity), reduces the need for new power plants, reduces the need to import petroleum from foreign sources and lowers environmental emissions including greenhouse gases. In addition, more energy-efficient production processes and technologies accelerate industrial modernization and enable U.S. companies to compete more successfully in global markets.

The National Energy Plan recognizes that reduced energy intensity in American industry can improve industrial productivity, product quality, safety, and pollution prevention. The NEP stresses the importance of "modernizing conservation." The NEP also recommends funding "...those research and development programs that are performance-based and are modeled as public-private partnerships." The program also supports voluntary industry efforts to reduce industrial energy intensity which helps to reduce greenhouse gas emissions.

FY 2004 Budget Request

Existing research and development projects that hold significant potential for energy savings in specific industries (forest products, glass, metal casting, steel, aluminum, mining and chemicals) and their supporting industries will continue toward commercialization, and opportunities for greater performance will be evaluated.

In FY 2004, the Department of Energy is requesting $64.4 million, a decrease of $27.1 million from the FY 2003 budget request.

	Funding (dollars in thousands)	
Activity	**FY 2003 Request**	**FY 2004 Request**
• Industries of the Future (Specific)	52,285	24,037
• Industries of the Future (Crosscutting)	34,401	34,401
• Technical Program Management Support	4,791	5,991
Total-	$91,477	$64,429

Industries of the Future (Specific) activities

Industries of the Future (Specific) support cost-shared RD&D of advanced technologies to improve the energy efficiency and environmental performance of America's energy- and waste-intensive industries. To provide the best value for public investments, activities focus on basic materials processing industries in which technology advances can achieve major reductions in energy intensity.

The Industries of the Future (Crosscutting) activities

Industries of the Future (Crosscutting) works with industrial partners and suppliers to conduct cost-shared RD&D on technologies with potential applications across many industries, focusing on: (1) advanced industrial materials to increase component life, improve product quality and optimize process operations; (2) high-efficiency, clean combustion technologies; and (3) advanced sensors/control systems to increase process efficiency and productivity, even in harsh, high-temperature environments. The program's Best Practices activities provide technical assistance to expedite the adoption of energy-efficient and clean manufacturing technologies; the Industrial Assessment Centers provide energy and productivity assessments to small and mid-sized manufacturing facilities.

FY 2004 Focus

- Efforts will proceed with several industries – including iron and steel, chemicals, forest and paper products – where partnerships have been formed to support industry actions to reduce greenhouse gas emissions.

- Industries of the Future (Specific) will continue activities with the highest long-term national energy potential savings and evaluate RD&D opportunities for achieving even greater performance beginning in FY05.
- Develop alloys with superior high-temperature strength and resistance to wear, corrosion, and fatigue; develop innovative processing methods to fabricate metallic components and acquire thermochemical data for rapid screening of candidate Advanced Industrial Materials.
- Complete full-scale design and production and start demonstration of prototype High-Efficiency Combustion Systems technologies to improve efficiency by up to 15 percent and achieve single-digit ppm NOx.
- Sensors and Control Technologies activities will include demonstrating a hydrogen sensor in production plant; develop machine pattern recognition, and other techniques to improve yield and reduce waste; and advance dynamically reconfigurable wireless telemetry.
- Best Practices activities will: continue to provide technical assistance to plant sites; select five plant-wide assessments for cost-shared financial assistance; and continue efforts to replicate results from prior awards in industrial facilities with similar process lines.
- The Industrial Assessment Centers will conduct approximately 750 assessment days of service to manufacturing clients and provide energy training to over 150 engineering students at 26 participating universities.

Solar Energy Technologies Program

The Solar Energy Technologies Program is working to find ways to help meet America's energy needs by developing solar energy devices and systems that are more efficient, reliable, and affordable.

Solar energy technologies convert sunlight into electric power, process heat, hot water, and lighting. This can be accomplished on scales ranging from kilowatts to megawatts and can be used by electric utilities, manufacturing plants, commercial buildings, and residences. The Solar Energy Technologies Program currently includes development of photovoltaic systems, concentrating solar power troughs and dishes and solar hot water heaters. It also includes balance-of-system components such as DC to AC power inverters and battery charge controllers.

The Solar Energy Technologies Program encompasses technology development from the seminal idea, through basic and applied research, to engineering development and technical readiness validation. To accomplish its mission, the program is focusing research on new and advanced types of solar devices and is directing efforts in the following three interrelated research areas:

- ***Photovoltaics (PVs)*** – PV technologies are semi-conducting materials that directly convert sunlight into electricity. Modular by nature and with no moving parts, they can be placed almost anywhere solar light is available.
- ***Solar Buildings*** – The Solar Buildings subprogram is modernizing solar water heating by developing advanced polymer materials to create lightweight, easier-to-install, cost-competitive systems.
- ***Concentrating Solar Power (CSP)*** – CSP systems use dishes for smaller, decentralized systems or troughs and towers for larger, centralized systems to redirect and concentrate sunlight to power steam or other heat engines to generate electricity.

The Solar Energy Program addresses national priorities for energy, environmental, and security policies. The technologies developed by this program will provide the Nation with a widely-available domestic energy resource to help meet electricity needs, particularly peak need in areas with large are conditioning loads, and reduce the stress on our critical electricity infrastructure.

FY 2004 Budget Request

In FY 2004, the Department of Energy is requesting $79.7M for the solar program, approximately level funding with the FY 2003 request.

The PV subprogram conducts a balanced R&D effort to reduce the cost of solar electricity. Fundamental research is key to continued advancement of photovoltaic technology necessary to meet long-term goals of $0.06/kWh electricity. Development of thin films is a major thrust. In addition, systems engineering and reliability research focuses on the critical need to improve reliability of the entire PV system, including balance-of-system components such as DC to AC power inverters and battery charge controllers. Emphasis is placed on four technical objectives: (1) reducing life-cycle costs; (2) improving reliability of systems and system components; (3) increasing and assuring the performance of fielded systems; and (4) removing barriers to the use of the technology. To help remove barriers, the engineering and reliability activity supports development of standards and codes and procedures for certifying performance of commercial systems.

The Solar Water and Space Heating research activity develops solar technologies that provide hot water and space heating for residential and commercial buildings. The research emphasizes low-cost, polymer-based solar water heaters to cut the cost of solar water heating by 50 percent to an equivalent of $0.04/kWh by 2005, which is expected to expand the market. The initial emphasis is on systems designed for mild climates, gradually shifting to systems for hard-freeze climates.

No funding is requested for CSP activities during the fiscal year.

	Funding (dollars in thousands)	
Activity	**FY 2003 Request**	**FY 2004 Request**
Photovoltaic Energy Systems-		
• Fundamental Research	30,400	30,400
• Advanced Materials and Devices	29,793	29,793
• Technology Development	13,500	16,500
Solar Building Technology Research-		
• Solar Water and Space Heating	4,000	3,000
Concentrating Solar Power-		
• Distributed Power System Development	1,932	0
Total-	$79,625	$79,693

FY 2004 Focus

- The PV Science Initiative with universities will continue to develop next-generation PV materials and devices that have the potential for dramatic cost reduction, including: thin film research focusing on semiconductor solid phases, defects, and impurities to optimize and improve performance; processing methods and devices to improve large-area deposition techniques and growth mechanisms; measurements and characterization to identify efficiency-limiting defects to advance the fundamental understanding of both PV materials and devices using state-of-the-art characterization techniques; and funding for the High Performance Initiative to double efficiencies for thin film modules.

- The Thin Film Partnership will support the most innovative research on silicon crystal growth methods with improved throughput, conversion efficiency, and lower manufacturing energy and materials cost as compared to current methods.

- Funding will increase for critical systems engineering and reliability research, with an emphasis on inverter reliability. Working with Regional Experiment Stations, the program will improve the reliability of distributed grid-tied systems, especially in the buildings sector. Building-integrated PV research to more fully integrate PV into

buildings and support the Zero-Energy Buildings activity (now managed within the Building Technologies Program) will continue. Finally, the program will maintain core technology analysis and outreach activities.

- The Solar Building Technology subprogram will evaluate field data from low-cost water heating systems deployed in FY 2002, continue development of a polymer water heater capable of operation in cold climates, and test the polymer-based balance-of-system components needed for the cold-climate system.

- DOE is requesting that the CSP subprogram be terminated in FY 2004 based upon findings from the National Research Council in 2000 that cast doubt on the potential of large-scale CSP plants to reduce costs to levels required to penetrate broad domestic energy markets. However, the Strategic Program Review recommended that EERE "conduct detailed analysis to determine if advanced technologies can provide a path for towers to become competitive in the United States. Further research in this area would depend on these findings."

Weatherization and Intergovernmental Program

The Weatherization and Intergovernmental Program develops, promotes and accelerates the adoption of energy efficiency, renewable energy and oil displacement technologies and practices by State and local governments, weatherization agencies, communities, companies, fleet managers, building code officials, technology developers, Native American tribal governments and international partners. Established after EERE's 2002 Strategic Program Review identified a need to strengthen the analytical underpinnings of EERE's market transformation programs, the Weatherization and Intergovernmental Program consolidated several EERE programs.

The Weatherization and Intergovernmental Program funds activities to move energy efficient and renewable energy products into the marketplace and, based on the needs and choices of State agencies and others responsible for determining how local needs are met, helps match new energy technologies, products and services to market needs. Comprised of grant- and deployment-related activities previously located throughout EERE, the Weatherization and Intergovernmental Program incorporates diverse activities which address all energy markets and provide a wide range of benefits. Program activities support National Energy Plan recommendations to facilitate rapid deployment of clean energy technologies and energy efficient products. These activities include providing technical and financial assistance to States, local governments and communities; expanding the Energy Star Program to schools, retail buildings, health care facilities and homes; and supporting collaborative research, development, and field testing of energy efficient technologies.

The Weatherization Assistance Program improves the energy efficiency of the homes of low-income families. The request supports the Presidential commitment to increase the investment in the program by $1.4 billion over ten years. The program is delivered through a network of 970 local agencies throughout the country. The families benefitting from the program spend 15-20 percent of their income for energy, compared with five percent or less for other Americans.

International Renewable Energy and Tribal Energy – two components of the "intergovernmental" portion of the program – support bilateral and multilateral agreements that foster information exchange on renewable energy and energy efficiency technology. These activities encourage public-private partnerships to expand worldwide markets for U.S. manufacturers of these technologies and assist educational institutions in developing workshops, creating renewable energy curricula and planning multi-year activities.

International activities help U.S. energy firms that compete in foreign markets by working to reduce international market barriers to trade and investment in U.S. energy efficiency and renewable energy products and focusing on emerging energy issues and clean energy market development.

Gateway Deployment brings together EERE's building, industry, and transportation outreach activities to the States and communities and integrates them into a into a coordinated delivery system. The activities include *Rebuild America* to improve the efficiency of existing buildings, *Building Energy Codes* to improve the efficiency of new buildings, *Clean Cities* to support the use of alternative fuel vehicles through community coalitions, *Energy Star* to promote the sale of energy-efficient products, *Inventions and Innovations* to support the creation of new energy-saving technologies and *Energy Efficiency Information and Outreach* to educate Americans about energy-saving products and practices.

The Weatherization and Intergovernmental Program receives appropriations from both the Interior and Related Agencies and Energy and Water Development subcommittees. Interior activities focus on weatherization assistance, State energy programs and deployment programs such as *Rebuild America, Clean Cities, Energy Star*, international market development and energy efficiency information and outreach. Energy and Water Development activities focus on renewable energy support and implementation such as the international renewable energy and Indian Renewable Energy Resources subprograms.

FY 2004 Budget Request

In FY 2004, the Department of Energy is requesting $369.5 M for the Weatherization and Intergovernmental Program, reflecting an increase in weatherization assistance, no change in assistance to State energy programs from FY 2003 funding levels and a decrease in funding for

Gateway and Tribal Energy programs. The National Industrial Competitiveness through Energy, Environment, and Economics (NICE3) activity will be concluded in FY 2004.

The program is organized into the following areas of activity:

	Funding (dollars in thousands)	
Activity	**FY 2003 Request**	**FY 2004 Request**
Energy and Water Development-		
• International Renewable Energy Program	6,500	6,500
• Tribal Energy	8,307	6,000
Interior-		
• Weatherization Assistance	277,100	288,200
• State Energy Program	38,798	38,798
• Other State Energy Activities	2,353	2,353
• Gateway Deployment	41,195	27,609
Total-	374,253	369,460

FY 2004 Focus

In FY 2004, the Weatherization and Intergovernmental Program will focus on its core responsibilities: weatherization assistance, funding for State energy program grants and outreach to support National Energy Plan initiatives. The program's goal is to weatherize 126,000 homes in 2004, for a cumulative total of 5.3 million homes weatherized since the program began. Other goals include assisting over 500 new and existing *Rebuild America* partnerships in upgrading 70 million square feet of school, public housing and government floor space; extending the *Energy Star* Program to schools, retail buildings, health care facilities and homes; and helping to reduce international market barriers to trade and investment as a component of the international program through supporting clean energy market development and working on emerging energy issues.

Wind and Hydropower Technologies Program

The Wind and Hydropower Technologies program conducts research and development in support of the Nation's fastest growing and the most widely used renewable energy resources. The Wind and Hydropower Technologies program addresses national energy, environmental, and security priorities. For example, wind energy and hydropower emit no air pollution or greenhouse gases, and they produce significant amounts of bulk power to meet America's growing need for clean, domestic sources of electricity.

From 1991 to 2001, electricity production from wind turbines in the U.S. more than doubled – a rate faster than any other form of power generation – and wind energy research efforts have reduced the cost of electricity generation by a factor of twenty since 1982. Wind systems can serve a wide range of high value, distributed power applications that include: supplemental on-site power generation for grid-connected suburban and rural residences, farms, and businesses; stand-alone power supply in conjunction with hybrid system technologies to serve remote or island energy needs; and dedicated power for applications such as water pumping and icemaking.

Hydropower is the most widely used form of renewable energy in the world today and accounts for about 7 percent of total electricity generation in the U.S. and over 75 percent of domestic renewable electricity generation. While hydropower electricity generation is done at a relatively low cost, environmental effects, like fish mortality, do occur. The Department of Energy is supporting the development of new turbine technology that reduces fish mortality associated with hydropower plant operation.

The program conducts research, development, testing, and field verification of wind and hydropower systems through laboratory and public-private partnerships. In pursuing these activities, the program regularly obtains input from experts in the private sector. The perspectives of wind and hydropower practitioners helps to ensure that the program's research directions and priorities are properly aligned with the needs of equipment manufacturers, electric utilities, regional organizations, State and other Federal agencies, and other stakeholders.

FY 2004 Budget Request

In FY 2004, the Department of Energy is requesting $49.1M, a decrease of $2.4 from the FY 2003 request. The Wind and Hydropower Technologies program is being restructured for fiscal year 2004 to include two subprograms: (1) Wind Energy and (2) Hydropower. Key activities support achieving program goals in technology viability and technology application. These changes align the Wind and Hydropower Technologies program with the Department's priorities

for renewable energy technology and will enable it to strategically streamline activities and clarify linkages to program goals for enhanced performance-based management.

	Funding (dollars in thousands)	
Activity	**FY 2003 Request**	**FY 2004 Request**
Energy and Water Development- Wind		
• Technology Viability	29,800	29,800
• Technology Applications	14,200	11,800
Energy and Water Development- Hydropower		
• Technology Viability	5,089	5,589
• Technology Applications	2,400	1,900
Total-	$51,589	$49,089

FY 2004 focus

In FY 2004, the wind subprogram will focus on R&D on Low Wind Speed Technology for Small and Large Wind Turbines to enable economically competitive wind technology development for moderate wind resource areas. The hydropower subprograms will focus on R&D to develop new environmentally-friendly turbines to maintain U.S. hydropower generation capacity. Specific efforts will include:

Continued low wind speed technology R&D efforts through component and full turbine prototype development and testing;

Activities to facilitate integration of wind energy into power delivery systems;

Complementary R&D with outreach to identify and remove institutional barriers to wind technology development;

Continues full-scale testing of environmentally-friendly hydropower turbines and biological studies on turbine-fish impacts; and

Complete resource assessment of low head/low power hydropower resources in the U.S.

PROGRAM MANAGEMENT

The corporate information, analysis, oversight and leadership required for efficiently and effectively implementing the EERE portfolio poses several institutional challenges that make corporate level management and integration very complex. This budget component provides Federal staffing resources as well as associated properties, equipment, supplies and materials required to support the responsive management and oversight of programs. Activities also include necessary funds for support service contractors; information systems and technology equipment; travel; crosscutting performance evaluation, analysis and planning; and new EERE initiatives.

In addition, Program Management supports all Headquarters staff, six Regional Offices (ROs), the Golden Field Office in Colorado, the National Renewable Energy Laboratory (NREL) capital budget, and several DOE employees at three Operations Offices to plan and implement EERE activities as well as facilitate delivery of applied R&D and grant programs to Federal, regional, State, and local customers. In FY 2004, the Department is requesting $93.1 million in total for these activities.

The Golden Field Office supports EERE through field project management of R&D partnerships, laboratory contract administration, and a variety of professional, technical, and administrative functions, including administering the management and operating contract for NREL and providing procurement, legal, business management, information resource management, and technical support to the ROs.

EERE's ROs – located in Atlanta, Boston, Chicago, Denver, Philadelphia, and Seattle – help implement energy efficiency and renewable energy strategies at the State and local level by working with States and communities to promote EERE programs. The ROs identify and engage community and state partners and integrate EERE programs with public and private sector activities. The ROs' role in administering grants, managing projects, and delivering programs that accelerate market penetration of energy efficiency and renewable energy technologies is key to implementing EERE's mission. Major activities include:

administering EERE's principal technology deployment grant programs, including the Weatherization Assistance and the State Energy Programs;

delivering EERE's principal technical assistance programs, including Clean Cities, Rebuild America, and the Federal Energy Management Programs;

serving as EERE's liaison to State Energy Offices, other State agencies, regional organizations, and other stakeholders involved in energy and environmental quality issues; and

providing EERE's national program managers with customer feedback on how to make EERE programs more efficient and effective.

The Energy Conservation Program Management budget component provides executive and technical direction, information, analysis, and oversight required for efficient and productive design and implementation of those programs funded by Energy Conservation appropriations in the Office of Energy Efficiency and Renewable Energy of the United States Department of Energy. In addition, Program Management supports all EERE headquarters and field staff as they plan and implement EERE activities as well as facilitate delivery of applied R&D and grant programs to Federal, regional, State, and local customers.

Office of Energy Efficiency and Renewable Energy Funding Summary by Program				
	FY 2003 Request ($ thousands)	FY 2004 Request ($ thousands)	FY 2004 vs. FY 2003	
			$ change ($ thousands)	% change
Hydrogen, Fuel Cells and Infrastructure Technologies	97,381	165,482	+68,101	+69.9
FreedomCAR and Vehicle Technologies	153,563	157,623	+4,060	+2.6
Weatherization and Intergovernmental	374,253	369,460	-4,793	-1.3
Solar Energy Technology	79,625	79,693	+68	+0.1
Wind and Hydropower	51,489	49,089	-2,400	-4.7
Geothermal Technologies	26,500	25,500	-1,000	-3.8
Distributed Energy and Electrical Reliability	131,290	128,650	-2,640	-2.0
Building Technologies	60,563	56,563	-4,000	-6.6
Industrial Technologies	91,477	64,429	-27,048	-29.6
Biomass	109,944	78,558	-31,386	-28.5
Federal Energy Management	26,425	22,262	-4,163	-15.8
National Climate Change Technology Initiative	20,000	24,500	+4,500	+22.5
Facilities and Infrastructure	5,000	4,950	-50	-1.0
Program Direction	91,141	93,241	+2,100	+2.3
Total, Energy Efficiency and Renewable Energy	1,318,651	1,320,000	+1,349	+0.1